Instruction begins in the first year with examination of the eye and a lecture on various aspects of ocular disease. During the second year, students will receive a refresher lecture and lab on direct ophthalmoscopy as well as a lecture on ophthalmic manifestations of systemic disease and primary ocular disease. During the third year, students are given the opportunity during the surgery clerkship to spend four weeks on the ophthalmology services. In addition, during the third year there are lectures given to students during the Internal Medicine rotations. In the fourth year, a four-week intensive clinical rotation is tailored to students interested in pursuing ophthalmology as a career. Also, research electives are available under the guidance of numerous ophthalmology faculty members for fourth-year students.

Website: [http://ophthalmology.wustl.edu](http://ophthalmology.wustl.edu)

**Degrees & Requirements**

While the Department of Ophthalmology and Visual Sciences does not offer its own degree, some of the department's courses are open to students in the MD and MSTP (MD/PhD) programs. Further information about the MD and MSTP degrees can be found in the Degrees & Programs Offered [section](http://bulletin.wustl.edu/medicine/degrees) of this Bulletin.

**Research**

**M50 Ophth 900**

**Usha P. Andley, PhD**
1114-C McMillan
Phone: 314-362-7167
Molecular basis of cataract; the function of molecular chaperones in cataract; proteomics, imaging and biochemical studies on cell culture and mouse models for crystallin gene mutations linked with cataract; testing drugs to inhibit cataract.

**Rajendra S. Apte, MD, PhD**
Email (apte@vision.wustl.edu)
Innate immunity and immune effector mechanisms in the retina, oxidative stress and cell death, models of developmental angiogenesis and neovascularization, inflammation and photoreceptor survival, macular degeneration.

**Steven Bassnett, PhD**
1114 McMillan
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Eye development, stochastic models of lens growth, stem cell biology, age-related cataract, UV-induced somatic mutation, ocular manifestations of Marfan syndrome, cell death suppression on the optic axis, cell biology of transparent tissues.

**Anjali Bhorade, MD**
Phone: 314-362-5343
Evaluating the effect of glaucoma on visual function in older adults in the home. Understanding the relationship between vision and driving in older adults with glaucoma.

**Shiming Chen, PhD**
618 McMillan
Phone: 314-747-4350
The molecular mechanisms regulating photoreceptor gene expression and the implications in understanding photoreceptor development and disease. We are focusing on three transcription factors, CRX, NRL and NR2E3, linked to photoreceptor degenerative diseases. Molecular genetics and biochemical approaches are used to identify the regulatory pathways associated with each factor. Mouse models are used to understand why mutations in these factors cause disease and develop therapeutic strategies, including AAV-gene therapy.

**Steven M. Couch, MD**
Email (couch@vision.wustl.edu)
Orbital inflammatory diseases, surgical techniques and novel treatments of periorbital/orbital disease.

**Susan M. Culican, MD, PhD**
1104 McMillan
Email (culican@wustl.edu)
Clinical: development of a low-cost, simple visual function task for screening for macular disorders in the primary care setting. Education: examination of the utility of assessment tools for evaluating resident clinical progression during residency training. Development of new metrics to gauge resident progress.

**Philip L. Custer, MD**
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**Thomas A. Ferguson, PhD**
1207 McMillan
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Molecular basis of immune tolerance and how apoptotic cells tolerate the immune response. The role of immune privilege in the pathogenesis of eye diseases such as age-related macular degeneration (AMD). The role of basal autophagy in the cells of the eye by using the cre-loxP system to delete essential autophagy genes from specific cell types in the eye.

**Mae Gordon, PhD**
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Ocular hypertension, glaucoma, keratoconus, adenoviral conjunctivitis, randomized clinical trial methodology, patient-reported outcome measures and measurement reliability.

George J. Harocopos, MD
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Age-related cataract, ophthalmic pathology.

Andrew Huang, MD, MPH
106 McMillan
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Ocular surface stem cell biology, molecular therapy for corneal dystrophies and corneal neovascularization, oxidative stress of corneal endothelium, clinical research on dry eye and ocular surface disease.

Humeyra Karacal, MD
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Treatment of uveitis, prevention of cataracts with anti-oxidants, anti-oxidants in age-related macular degeneration, retinal imaging and analysis using data mining techniques, designing OR equipment to facilitate ophthalmic surgery.

Michael A. Kass, MD
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Principal Investigator of the Ocular Hypertension Treatment Study (OHTS). Diagnosis, treatment and public health aspects of glaucoma.

Vladimir Kefalov, PhD
625 McMillan
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Photoreceptor Neurobiology and Retinal Degeneration. We are a sensory neurobiology lab interested in the function of mammalian rod and cone photoreceptors. In addition, we are interested in the mechanisms of neurodegeneration in the retina and are working on developing pharmacological and gene-therapy tools for preventing photoreceptor cell death.

Daniel Kerschensteiner, MD
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To understand the principles that guide the assembly of neural circuits and to decipher the way they process information. We would like to understand the principles that guide the assembly of neural circuits in the retina and to decipher the way they process information and hope to identify features of the retinal circuit architecture that perform particular computations and characterize how they arise during development. We then probe underlying mechanisms of circuit assembly and function through genetically targeted manipulations of specific cells in the retina.

John T. Lind, MD, MS
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Glaucoma education, resident education, pharmacologic and surgical treatment of glaucoma, ophthalmic microbiology.

Gregg T. Lueder, MD
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Retinoblastoma, eye misalignment (strabismus), retinopathy of prematurity, abnormal tearing, nasolacrinal disorders, cataracts, glaucoma.

Peter Lukasiewicz, PhD
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Neurotransmitters, synapses, retinal function in health and disease, retinal information processing.

Todd P. Margolis, MD, PhD
Email (margolist@vision.wustl.edu)
1. Cellular and molecular mechanisms that regulate herpes simplex infection neurons.
2. Inexpensive telemedicine for reducing blindness in underserved populations.

Josh Morgan, PhD
Email (jlmorgan@wustl.edu)
Synaptic connectivity of visual circuits. Our goal is to understand the structure, development and pathology of synaptic connectivity that gives rise to vision. Our core approach is to reconstruct neural circuits in the retina and visual thalamus using large-scale 3D electron microscopy.

John R. Pruett Jr., MD, PhD
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We use fcMRI to study the development of large-scale functional brain networks in infants at risk for autism spectrum disorder. We are specifically interested in fcMRI correlates of visual joint attention. Collaborative projects involve fcMRI studies of visual-motor integration.

Kumar Rao, MD
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Nathan Ravi, MD, PhD, MS, FAAO
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Directed toward understanding the pathophysiology of presbyopia and developing medical or surgical treatments for this condition.

Alan Shiel, PhD
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Molecular genetic mechanisms underlying cataract, glaucoma and associated eye disorders: (1) genome-wide linkage analysis and targeted (exome, amplicon) sequencing for discovery of causative or susceptibility genes. and (2) genotype-phenotype and functional expression studies of naturally occurring and gene-targeted mouse models to characterize pathogenic mechanisms.

Carla J. Siegfried, MD
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My research is focused on ocular oxygen metabolism and the development of open-angle glaucoma. We are studying how the oxygen gradient in the eye is altered in disease states as well as noninvasive methods of measuring corneal oxygen consumption.

Florentina Soto, PhD
Email (sotolucasf@vision.wustl.edu)
Studies in my laboratory aim to identify the molecular basis of dendrites and axons lamination and synapse formation during development and in the adult retina. In addition, we investigate how these molecules could be involved in the development of retinal pathologies including retinal degeneration.

Larry Tychsen, MD
2S89 Eye Clinic, St. Louis Children’s Hospital
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Principal investigator on NIH-funded studies of visual brain maldevelopment and repair in infant primates, as well as clinical studies of visuomotor abnormalities in cerebral palsy and pediatric refractive surgery.

Gregory P. Van Stavern, MD
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Neuroimaging of the visual pathways, Idiopathic Intracranial Hypertension, evidence-based medicine and clinical decision making; using the visual system as a model to study neurologic disorders.

A further description of research labs can be found on the Vision Core Researchers webpage (http://vrcore.wustl.edu/residentstudentresearchopportunities/RSROHome).

Faculty

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Peter Lukasiewicz, PhD

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Susan Culican, PhD, MD

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Rajendra Apte, MD, PhD

Visit our website for more information about our faculty (http://ophthalmology.wustl.edu/Faculty) and their appointments.

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Instructor in Clinical Ophthalmology and Visual Sciences (primary appointment)
BS Saint Louis University 2001
MD Saint Louis University 2005

Frederick W Schwagger, OD, BS1
Adjunct Instructor in Ophthalmology and Visual Sciences (primary appointment)
BS Illinois College of Optometry 1957
OD Illinois College of Optometry 1957
BS1 Washington Univ in St. Louis 2000

Christopher G Seep, OD
Adjunct Instructor in Ophthalmology and Visual Sciences (primary appointment)
BA University of Missouri 1971
OD University of MO St Louis 1984

David Brian Seibel, OD
Adjunct Instructor in Ophthalmology and Visual Sciences (primary appointment)
OD University of Missouri 1987

Gaurav Kirit Shah, MD
Professor of Clinical Ophthalmology and Visual Sciences (primary appointment)
MD University of Illinois 1993

James Banks Shepherd III, MD
Associate Professor of Ophthalmology and Visual Sciences (primary appointment)
BA Amherst College 1992
MD Columbia University 1997

Priya Saigal Shetty, MD
Instructor in Clinical Ophthalmology and Visual Sciences (primary appointment)
MD University of Michigan 2007

Arsham Sheybani, MD
Assistant Professor of Ophthalmology and Visual Sciences (primary appointment)
MD Washington Univ in St. Louis 2008

Steven M Shields, MD
Assistant Professor of Clinical Ophthalmology and Visual Sciences (primary appointment)
MD Washington Univ in St. Louis 1986
BS Washington Univ in St. Louis 1981
Alan Shiel, PHD
Professor of Ophthalmology and Visual Sciences (primary appointment)
Professor of Genetics
PHD University of London 1983
BS School Not Listed 1979

Howard Newton Short, MD
Instructor in Clinical Ophthalmology and Visual Sciences (primary appointment)
MD Saint Louis University 1978
BA Washington Univ in St. Louis 1974

Carla J Siegfried, MD
Jacquelyn E and Allan E Kolker M.D. Distinguished Professor of Ophthalmology (primary appointment)
MD University of MO Kansas City 1989
BA University of MO Kansas City 1989

Charles D Signorelli, OD
Adjunct Instructor in Ophthalmology and Visual Sciences (primary appointment)
OD School Not Listed 1957
BS School Not Listed 1957

Morton Edward Smith, MD
Professor Emeritus of Ophthalmology and Visual Sciences (primary appointment)
Associate Dean Emeritus for Post-Graduate Education
Lecturer in Ophthalmology and Visual Sciences
Lecturer in Pathology and Immunology
MD University of Maryland 1960
BS University of Maryland 1956

Bradley Thomas Smith, MD
Instructor in Clinical Ophthalmology and Visual Sciences (primary appointment)
MD University of AL Birmingham 2002

Claud Randall Snowden, OD
Adjunct Instructor in Ophthalmology and Visual Sciences (primary appointment)
BS Illinois College of Optometry 1972
OD Illinois College of Optometry 1974

Craig H Sorce, OD
Adjunct Instructor in Ophthalmology and Visual Sciences (primary appointment)
OD University of Missouri 1992
BA Southern Illinois University 1988

Florentina Soto Lucas, PHD
Associate Professor of Ophthalmology and Visual Sciences (primary appointment)
PHD University of Alicante 1992

Mark H Spurrier, MD
Instructor in Clinical Ophthalmology and Visual Sciences (primary appointment)

MD Washington Univ in St. Louis 1980
BA Kansas State University 1976

Joseph Steska
Instructor in Ophthalmology and Visual Science (primary appointment)

Michael Vincent Stock, BE1, BE, MD
Instructor in Ophthalmology and Visual Sciences (primary appointment)
BE1 Vanderbilt University 2008
BE Vanderbilt University 2008
MD Washington Univ in St. Louis 2012

James F Strieter, MBA, OD
Adjunct Instructor in Ophthalmology and Visual Sciences (primary appointment)
BS School Not Listed 1953
MBA Southern Ill Univ Edwardsville 1988
OD School Not Listed 1954

Brian Patrick Sumner, OD
Adjunct Instructor in Ophthalmology and Visual Sciences (primary appointment)
OD Illinois College of Optometry 1978

Kenneth V Swanson
Instructor in Clinical Ophthalmology and Visual Sciences (primary appointment)

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Paul M Tesser, MD, PHD
Associate Professor of Clinical Ophthalmology and Visual Sciences (primary appointment)
MD State Univ of NY Stonybrook 1991
PHD State Univ of NY Stonybrook 1990
BS Mass Inst of Technology (MIT) 1981

Matthew A Thomas, MD
Professor of Clinical Ophthalmology and Visual Sciences (primary appointment)
BS Harvard University 1977
MD Harvard University 1991

Linda Mei-Lin Tsai, MD
Professor of Ophthalmology and Visual Sciences (primary appointment)
MD Northwestern University 1995
BA Northwestern University 1990

Robert Lawrence Tychsen, MD
Professor of Ophthalmology and Visual Sciences (primary appointment)
John F Hardesty MD Distinguished Professor of Ophthalmology and Visual Sciences
Professor of Neuroscience
Professor of Ophthalmology and Visual Sciences in Pediatrics
BS Georgetown University 1975
Gregory Paul Van Stavern, MD  
Professor of Ophthalmology and Visual Sciences (primary appointment)  
Professor of Neurology  
BS La Salle University 1989  
MD Pennsylvania State University 1993  

Gary Lee Vogel, OD  
Adjunct Instructor in Ophthalmology and Visual Sciences (primary appointment)  
OD Ohio State University 1977  
BA University of Iowa 1970  

David Edward Vollman, MD  
Associate Professor of Ophthalmology and Visual Sciences (primary appointment)  
MD Ohio State University 2006  

James J Wachter, OD  
Adjunct Instructor in Ophthalmology and Visual Sciences (primary appointment)  
BA Saint Louis University 1987  
OD Illinois College of Optometry 1991  
BS Illinois College of Optometry 1990  

William Lee Walter, MD  
Assistant Professor of Clinical Ophthalmology and Visual Sciences (primary appointment)  
MD Ohio State University 1954  
BA De Paul University 1950  

Donald E Walter Jr, OD  
Adjunct Instructor in Ophthalmology and Visual Sciences (primary appointment)  
BS University of Houston 1971  
OD University of Houston 1972  

Stephen R Waltman, MD, MBA  
Professor of Clinical Ophthalmology and Visual Sciences (primary appointment)  
MD Yale University 1964  
BS Mass Inst of Technology (MIT) 1961  

Stephan Alan Wexler, MD  
Professor of Clinical Ophthalmology and Visual Sciences (primary appointment)  
MD University of Michigan 1982  
BS University of Michigan 1977  

Richard Harris Wieder, MD  
Associate Professor of Ophthalmology and Visual Sciences (primary appointment)  
MD University of Illinois 1986  
BS University of Illinois 1982  

Michel L Wolf, OD  
Adjunct Instructor in Ophthalmology and Visual Sciences (primary appointment)  
BS University of Missouri 1979  
OD University of Missouri 1987  

Ming-Fong Agnes Wong, PHD, MD  
Adjunct Professor of Ophthalmology and Visual Sciences (primary appointment)  
PHD University of Toronto 2001  
BA Boston University 1990  
MD McGill University 1994  

Courses  
Curriculum courses for Ophthalmology and Visual Sciences are listed below (p. 13).  

First Year  
Introduction to clinical ophthalmology begins in the first year with a lecture and practicum (peer exam) on taking an ocular history and performing an ocular exam. Emphasis is on ophthalmoscopy. Lectures and practicum session will be led by Dr. John Lind and Dr. Morton Smith.  

Second Year  
During the second year, students will receive a refresher lecture and lab on direct ophthalmoscopy as well as a lecture on ophthalmic manifestations of systemic disease and primary ocular diseases.  

Third Year  
Third-Year Clerkship Opportunities  
In the third year, students are given the opportunity to spend four weeks of their surgery rotation on the ophthalmology service. The students work closely with the ophthalmology residents and review the differential diagnosis of the “red eye,” how to interpret an ophthalmologic consult note, and how to handle ocular emergencies. During this rotation, there is again emphasis on the use of the ophthalmoscope. Additional clinical skills introduced to student rotators include the use of the slit lamp and indirect ophthalmoscopy. All third-year students must complete the “Case Studies in Ophthalmology for Medical Students” and attend the periodic “feedback/oral exam” session with Dr. John Lind and/or Dr. Morton Smith.  

Third Year/Fourth Year  
Ophthalmology Sub-Internship Rotation (“The Sub-Eye”). During the month of June prior to fourth year, students interested in pursuing a career in ophthalmology are encouraged to rotate on this intensive four-week rotation. Students will have
personal indirect ophthalmoscopy lenses available for use on the rotation. Formal didactics and workshops will be used to teach students how to perform a detailed ophthalmic history and exam including mastery of advanced slit lamp techniques and indirect fundoscopy. There will be an intense schedule of both live and recorded lectures delivered by ophthalmology faculty members with post-lecture quizzes. Students will be expected to perform daily required reading. Retention and understanding of reading materials will be gauged by frequent quizzes. Students are strongly encouraged to present a case at the department's Grand Rounds. By the end of the rotation, students will be expected to function at the level of a first-year ophthalmology resident.

Curriculum Courses

M50 Ophth 801 Ophthalmology
This elective is for senior students who plan to apply for a residency in Ophthalmology. In accordance with any sub-internship, medical students will be expected to function at the level of a beginning first-year ophthalmology resident on this rotation. The students will rotate through the resident eye clinic and the subspecialty clinics of the full time faculty of the Washington University Medical School Department of Ophthalmology and Visual Sciences (e.g., neuro-ophthalmology service, cornea/external disease service, etc.). The first day of the rotation will consist of an orientation day in which students will receive extensive didactics and participate in workshops to learn the basics of a complete ophthalmic history and examination. Students may opt to check-out indirect ophthalmoscopy lenses that may be used for the month to facilitate the acquisition of fundoscopy skills. During the rotation, the student's responsibilities range from observation (including observing surgery) to working at a resident level and completing full eye examinations. There will be a rigorous academic curriculum for the rotation including a weekly case presentation, bi-monthly wet lab sessions with a resident, weekly attendance at grand rounds, and a mix of medical student-oriented and resident-oriented conferences. On day one, students will receive a rotating call schedule for the entire month. A medical student is expected to be present at all times to assist the primary call ophthalmology resident during the rotation. By the end of the four-week rotation, the student is expected to be proficient in taking an ocular history and performing a complete eye exam including slit lamp biomicroscopy and indirect ophthalmoscopy.

M50 Ophth 816 Away Rotation in Ophthalmology
This four-week elective is for senior students from medical schools across the United States who are in good standing at their home institution and who are planning to apply for a residency in ophthalmology. The students will rotate through the resident eye clinic and the subspecialty clinics of the full time faculty of the Washington University Medical School Department of Ophthalmology and Visual Sciences (e.g., neuro-ophthalmology service, cornea/external disease service, etc.). In exchange for a refundable deposit, students may opt to check-out indirect ophthalmoscopy lenses that may be used for the month to facilitate the acquisition of fundoscopy skills. During the rotation the student's responsibilities range from observation (including observing surgery) to working at a resident level and completing full eye examinations. Didactics will include weekly case presentation sessions to Dr. John Lind or Dr. Morton Smith, weekly attendance at grand rounds, and a mix of medical student-oriented and resident-oriented conferences. Also, there will be medical student-oriented workshops to learn the basics of the slit lamp and indirect ophthalmoscopy. On day one, students will receive a schedule of conferences that they are expected to attend during the month. By the end of the four-week rotation, the student is expected to be proficient in taking an ocular history and performing a complete eye exam including slit lamp biomicroscopy and indirect ophthalmoscopy. The final grade of the student is determined by the course director with input from the residents, fellows, and faculty members of the particular service(s) through which the student rotated.

M50 Ophth 900 Research Elective - Ophthalmology
Research opportunities may be available. If interested, please contact the Department of Ophthalmology.